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(54) **"Sliding sleeve"**

At a form-fitting pipe connection, a sliding sleeve is used that fits over both pipe ends, preferably with two interior circular grooves into which the pipe walls may be pressed in bead fashion in order to create one or two insulating zones with one or two insulating rings per circular group.

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"Sliding sleeve"

Patent claims

1. Sliding sleeve for form-fitting connections of metal and/or plastic pipes using insulating rings, characterized by a section of pipe (4; 14) with at least one inner circular ring groove (5; 15).

2. Sliding sleeve according to claim 1, characterized by two circular grooves (5; 15) in the groove angles with one insulating ring each (8, 9).

3. A procedure for creating a pipe connection using a sliding sleeve according to claim 1 or 2, characterized in that the pipe ends lying opposite to each other radially are pressed into at least one circular groove of the sliding sleeve.

4. A tool to create a pipe connection using a sliding sleeve according to claim 1 or 2. according to the procedure in claim 3, characterized by a usable pipe scraper with radially movable profile dies (17).

5. A tool according to claim 4, c h a r a c t e r i z e d i n t h a t the die (17) is guided in a die carrier (16) and connected to a pressure medium conduit through a common pressure chamber (19), or through the entire extent of axially moving wedges, which press the form die radially into the pipe.

6. A tool according to claim 4, c h a r a c t e r i z e d i n t h a t the die feet have a diagonal working with at least one axially movable wedge.

7. A tool according to claim 6, c h a r a c t e r i z e d i n t h a t the wedge stands directly or indirectly connected to a pressure chamber.

8. A tool according to one of claims 4 to 7, c h a r a c t e r i z e d i n t h a t the die carrier (16) at its ends is provided with stop shoes (18).

9. A tool according to one or more of claims 4 to 8, c h a r a c t e r i z e d b y insulating cuffs (22) on the scraper ends.

10. A tool according to claim 9, c h a r a c t e r i z e d i n t h a t the insulating cuffs (22) are set up between a front-face stop flange (20) and a ring piston (21) supplied by the pressure medium.

11. A tool according to claim 9 or 10, c h a r a c t e r i z e d b y a radial channel for a pressure medium (25).

The invention refers to a sliding sleeve for form-fitting connection of metal and/or plastic pipes, in particular steel pipes using insulating rings.

It is well-known and even today still widespread that one connects steel pipes with each other by circular welded seams. Welding on site is, however, extremely expensive and also demands intensive welded seam monitoring on site under unfavorable conditions. In addition, qualified welding personnel are required. Moreover, after welding, sometimes plastic coating or other insulation must be applied to the pipe ends.

In order to reduce the costs involved, the effort is to create form-fitting pipe connections. This occurs according to one of the processes known from the German patent application publication 1 525 741 with a special hydraulic device made from gripping clamp rings fastened to hydraulically movable draw anchors connected with coupling rings at the pipe ends and a widening cone set between the pipe ends. In this way, first one pipe end is widened using the widening cone, and then after removal of the widening cone the other pipe end is hydraulically forced into the expanded pipe end.

This process requires a significant expense for apparatus and demands a lot of room for the device for expanding and pressing; as a result, work in narrow ditches is not possible.

In order to avoid the expense for apparatus and the large space requirements of the procedure noted above, a form-fitting pipe connection with a movable sleeve and insulating rings is known from the German published patent application 1 809 491. The movable sleeve consists initially of a standard commercial piece of pipe that overlaps the connection point of the two pipes to be connected. To create a form-fitting connection, the sleeve is formed internally radially at both ends in such a way that the inner edges of the sleeve at the same time dig into the circular pipe beads that occur as the sleeve is distorted. Insulating rings are located in the area of the distorted sleeve ends, which should give sufficient pipe insulation due to the effect of the distorting pressure.

This process also requires a circular tool that grabs from the outside and forcibly connects the pipe ends with the movable sleeve, a task that is difficult on site, particularly in a pipe ditch. In addition, as a result of the radial distortion of the pipe ends, a significant part of the free pipe cross section is lost, so that in addition to other drawbacks, depending on the reduction of the cross section, scraping the conduit is no longer possible. In addition, without an additional expansion of the pipe ends, the insulating rings will be subject to the transport material and therefore are susceptible to the hazard of a deterioration of their insulating effect. Expansion of the pipe is an additional work process before connecting the pipes. The axial forces that result from the pressure in the conduit, which can be absorbed by the coupling, are thereby much smaller than required in conduit construction for medium and higher levels of pressure.

Forcing in the coupling ends into the covering surfaces of the pipes leads to a stress concentration that reduces stability. In the case of insulated pipes, post-insulation is always required due to the total design (cutting the sleeve edges and mechanical working from the outside).

The invention therefore has the task of avoiding the above-mentioned disadvantages of the familiar processes and pipe connections, and in particular has the task of creating a pipe connection, which, without a reduction of the cross section and without large expense for equipment, in particular without tools grasping from the outside, provides a safe pipe coupling that is gas and liquid tight, that is loaded on the axes, and that is subject to all of the mechanical loads of the pipe movements and of the pipe operation. The solution to this problem is based on the idea that the movable sleeve and the pipe ends outside of the movable sleeve should remain completely undistorted while at the same time creating a form-fitting connection on the interior of the sleeve. To be more precise, the invention consists of the fact that the movable sleeve consists of a piece of pipe with at least one inner ring, in which at the time of the creation of the pipe connection one or both pipe ends is distorted. If both pipe ends are pressed into a common groove, then they dig into the groove by flanges and claws and thus hold onto the particular insulating rings.

Preferentially, the movable sleeve has two ring grooves each with an elastomer or soft metal insulating ring in the groove angles.

In the procedure according to the invention, for the creation of a pipe connection by using a movable sleeve according to the invention, the pipe ends lying radially opposite each other are pressed outwards into at least one ring groove of the movable sleeve. In this case, the groove

edges lie on the pipe wall and press together the insulating rings into the groove angles, so that an insulated and form-fitting connection results. The insulating rings are thereby no longer affected by the transported material. Due to the use of various materials in coupling and pipes, a varied expansion behavior occurs, so that after closing the coupling initial stress affects the insulating ring. This effect is particularly important with metal insulators for pipes carrying warm materials.

For the procedure according to the invention, a movable pipe scraper with radially movable profile dies is particularly well-suited, which distort the pipe ends with beads and thus press into the circular grooves of the movable sleeve. The profile dies may be guided in a die carrier and may be radially moved by an axially movable grooved wedge with angled covering surfaces or also by several movable wedges over the entire extent. The effect of the pressure of the profile die without wedges occurs through a common pressure chamber, through which pressure is exerted on the inner faces of the die using a pressure medium. In the case of the wedge, every die foot has a diagonal that works with the surface of the wedge as a counter surface and has an effect on the axial movement of the wedges by use of a cylindrical piston unit, whose pistons are shaped conically in the area of the die feet or are shaped like a wedge. For stopping in the work process, the pressure scraper may be provided over its entire length preferentially with springed stop shoes lying opposite one another that press against the pipe wall.

In order to be able at the same time to complete a test of the pressure load,

the pipe scraper may have insulating cuffs at its ends and may be provided with a pressure medium channel that is already open to the outside or may be so opened.

The insulating sleeves preferentially lie between a front-side stop flange and a ring piston moved by the pressure medium. The ring piston presses the insulating cuff against its corresponding ring flange, and thus has the effect of pressing the insulating cuff radially tight against the inner wall of the pipe. In this way, a space that is gas and liquid tight arises between the insulating cuffs, which allows a test of the pressure load and which makes the standard pressure test of the entire pipe dispensable.

The possibility also rises of measuring the closing mechanism, that is, the pipe distortion, in a way that the applied pressure is shown graphically. The comparison with a predefined curve allows one to monitor the quality of the pipe connection directly, and, depending on the situation, to dispense with the otherwise required tests of pressure loads.

In general, the invention creates a form-fitting pipe connection using a plastic ring-shaped or bead type expansion of the pipe ends in the depressions of a movable sleeve, which fits all of the standard tensile and bending forces and can be used without significant expense for apparatus and without loss of cross section area easily on site in a short work process.

The invention is discussed in more detail in the following on the basis of examples of embodiments in the drawings.

In the drawings:

Figure 1 shows a pipe connection according to the invention,

Figure 2 shows a pipe scraper according to the invention with profile dies in two different positions, and

Figure 3 shows a cross section on the line III-III through the pipe scraper of figure 2, also with profile dies in two different positions.

The pipe ends 1, 2 connected with one another have not been worked and lie opposite one another in a movable sleeve 3 with two circular grooves 4, 5. Insulating rings 8, 9 are found in the groove angles 6, 7. In order to create a powerful pipe connection, the pipe ends are pressed into the circular grooves 4, 5. In this way bead-type domes 10, 11 are formed, which press the groove edges 12, 13 against the pipe wall and compress the insulating rings 6, 7. In this way, a form-fitting connection with a double insulation results on the interior without narrowing of the pipe.

Pressing the pipe ends into a movable sleeve 14 with formed grooves 15 running the length occurs with a pipe scraper. This pipe scraper has two groups of radially moving profile stamps 17 that are guided in a die carrier 16 and springed stop shoes 18 that lie against the pipe wall. The profile dies 17 are pressed by a pressure material that is not shown from a common pressure medium connected to the pressure chamber 19, and in this way, move outwardly in a radial fashion so that the pipe ends press with beads into the interior grooves 15. This is shown in the right section of figure 2 and in the left section of figure 3.

In order at the same time to complete a test of the pressure with the pipe scraper, an insulating cuff 22 is located between a front-facing stop flange 20 and a ring piston 21 on each of the scraper ends. The ring pistons 20 are supplied with a pressure medium through the radial channels 23 and then press the corresponding insulating cuff against the face of the flange 20, as shown in the left side of figure 2. In this way the insulating cuff 22 spreads out radially and finally lies gas and liquid tight against the pipe interior wall. In this way a closed area 24 arises between the two insulating cuffs 22 for the test of the pressure mode into which a pressure medium is introduced using a guidance channel 25.

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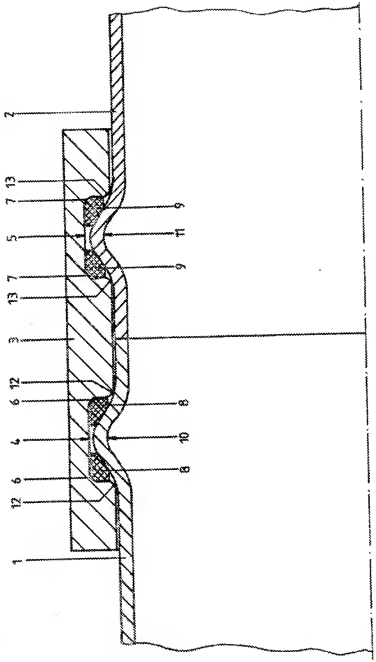

Fig. 1

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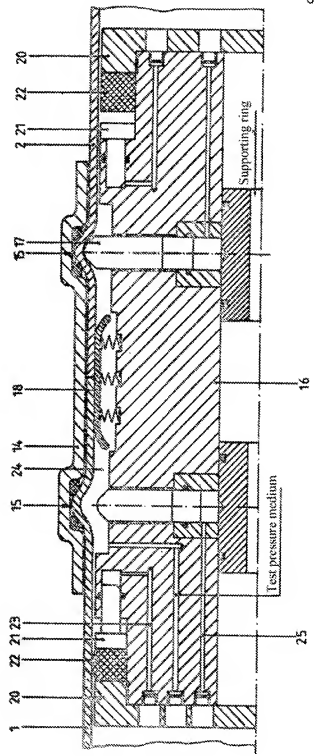

Fig 2

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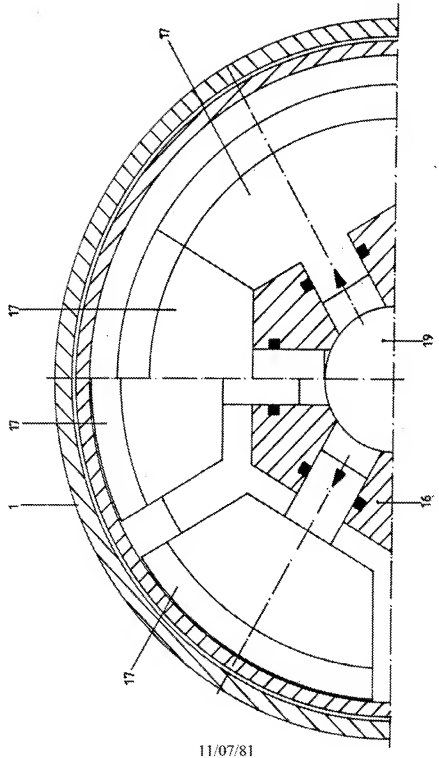

Fig.3